

Atty. Docket No.: CA1458
PATENT APPLICATION

AMENDMENT UNDER 37 C.F.R. § 1.116
U.S. Application No.: 09/760,345

REMARKS

Claims 1-22 are all the claims pending in the application. Claims 1-11 and 17 are being amended. No new matter is introduced.

The Examiner rejected claims 1-8 and 10 as being unpatentable over Ofek (U.S. patent No. 6,044,444) in view of Sicola et al. (U.S. patent No. 6,643,795). Applicant respectfully traverses this rejection in view of Applicant's amendments to claims 1-8 and 10, and, additionally, in view of the following arguments.

Specifically, the amended claims 1-8 and 10 generally recite a feature of the invention, wherein the remote (second) host group uses the received heartbeat signal to determine whether a failure has occurred or whether a failover should be performed. This feature of the invention is not taught or suggested in either Ofek or Sicola et al., or their combination.

Turning to the prior art cited by the Examiner, Ofek teaches two data storage systems 214 and 246, which are interconnected by a data link for remote mirroring of data, see Ofek, Fig. 4. In the Office Action, at page 5, third paragraph, the Examiner admits that Ofek does not teach or suggest sending the heartbeat signal. Because Ofek does not teach the heartbeat signal, it also does not teach using the received heartbeat signal to determine whether a failover should be performed.

The second reference cited by the Examiner, Sicola et al., teaches a data replication system having a redundant configuration including dual Fiber Channel fabric links interconnecting each of the components of two data storage sites, wherein each site comprises a host computer and associated data storage array, with redundant array controllers and adapters.

The system includes the capability of simultaneous bi-directional remote data replication, which

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permits the system to operate in an 'extended cluster' mode, as if each of the remote storage arrays were local relative to the respective remote host.

The portion of Sicola et al. that deals with sending a heartbeat signal is located at col 9, ln 50-67 of Sicola et al. In Sicola et al., the heartbeat signal (write command) is sent from controller A1 to the controller B1, see col 9, ln 57-63. Simultaneously with sending the heartbeat write command, the controller A1 starts a heartbeat timer, see col 9 ln 61-63. Upon the receipt of the heartbeat write command, the controller B1 sends an acknowledgement to the controller A1, indicating successful completion of the command, col 9, ln 64-67. If the heartbeat timer of the controller A1 times out prior to receiving the aforesaid acknowledgement from the controller B1, a failover is initiated by the controller A1, see col 10, ln 23-27. It is important to note that in Sicola et al., the failure determination and the initiation of the failover is performed by the same controller, which generates the heartbeat signal. This feature of Sicola et al. is drastically different from the features of the present invention recited in claim 1-8.

In other words, in Sicola et al., the local controller sending the heartbeat signal uses the acknowledgment received from the receiving remote controller to determine whether the remote controller as well as the data link between the storage systems is operational. On the other hand, in accordance with the aforementioned feature of the invention generally recited in amended claims 1-8 and 10, the remote or standby host receiving the heartbeat signal uses the received heartbeat signal to determine whether a failover should be performed. This claimed feature of the present invention is not taught or suggested in Sicola et al. and/or Ofek. For this reason, claims 1-8 are patentable over Ofek and Sicola et al.

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The Examiner rejected claims 9 and 11-22 as being unpatentable over Carter et al. (U.S. patent No. 6,553,401) in view of Sicola et al. (U.S. patent No. 6,643,795). Applicant respectfully traverses this rejection in view of Applicant's amendments to claims 9, 11 and 17 and, additionally, in view of the following arguments.

Specifically, neither Carter et al. nor Sicola et al. teach or suggest a feature of the present invention wherein the standby host group uses the received heartbeat signal to determine whether a failure occurred or whether a failover should be performed. First, in Carter et al., the determination of whether to perform a failover operation is made by the cluster manager and not by the standby host receiving the heartbeat signal, see Carter, col 3, ln 8-16. Second, Carter does not teach that the failover decision ("determining to reallocate the service") is made based on the received heartbeat signal. With respect to sending heartbeat signal, Carter simply states at col 6, ln 34-39, that "In an exemplary embodiment, the cluster manager determines whether a server 116A, 116B, . . . 116Z of the current subcluster 112A, 112B, . . . 112Z is available based upon heartbeat signals transmitted amongst the servers 116A, 116B, . . . 116Z of the server cluster 106." There is no teaching or suggestion in Carter to use the received heartbeat signal to make the failover determination.

Third, Carter et al. fails to teach how the received heartbeat signal is used by the standby host group. As stated above with respect to claims 1-8 and 10, Sicola et al. is also silent regarding the above claimed feature of the invention. For this reason, the combination of Carter et al. and Sicola et al. also does not contain the requisite teaching of the standby host group using the received heartbeat signal to determine whether a failure occurred or whether a failover should be performed.

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For this reason, the amended independent claims 9, 11 and 17 are patentable over Carter et al. and Sicola et al. Applicant further respectfully submits that Examiner's rejections of dependent claims 12-16 and 18-22 are rendered moot by the present amendment and that these claims are patentable at least due to their dependence on the patentable independent claims 11 and 17.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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MOUNTAIN VIEW OFFICE

23493

CUSTOMER NUMBER

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Respectfully submitted,


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CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this AMENDMENT UNDER 37 C.F.R. § 1.116 is being facsimile transmitted to the U.S. Patent and Trademark Office this 6th day of February, 2006.


Monica Moreno